



Linking Our Lives to Plants

Developed by the Public Programs Division

Grade Level 2-8+

This curriculum will guide adult leaders and students through a set of activities that will help students learn about plants and the ways they support human societies and our environment. It is designed to be broadly applicable and flexible to fit a variety of learning situations, ages, and formats.

Sections:

Laying the groundwork: What do you know about plants?

Explorations: Five Ways of Thinking About Plants

Making Connections

Branching Out

Feedback/Questions?

We'd like to hear from you about using this curriculum. We also want to hear your suggestions for additions to the list of films and literature for the Explorations section of the curriculum. Please let us know what worked well for your group. Contact us by email at cflanaga@aoc.gov, by telephone at 202-225-1269, or write to Christine Flanagan, U.S. Botanic Garden, 245 First Street SW, Washington, DC 20024.

❁ Laying the Groundwork: What do you know about plants?

Objective: To raise students awareness of the many ways that plants enter their lives.

Have students break up into four small groups. Allot a set time and assign one of the following questions for each group to discuss. A recorder in each group should list the ideas/answers:

1. *What products are made from plants or contain plant parts? List as many kinds as you can.*
2. *In what places, works of art, or on what objects have you seen images of plants (pictures, photos, drawings, sculptures)? List both places and things, e.g., the orange on a can of orange juice, or the apple in a painting of Adam and Eve.*
3. *What do plants contribute to the natural environment (the atmosphere, soil, other plants, and animals)?*
4. *What kinds of plants are found in places created by humans (e.g. homes, yards, cities)?*

Have each recorder post the answer lists on the board or on a poster. Discuss and further explore what your students know about plants by using their lists to answer the following questions. As your discussions bring up new answers or questions or the need for more information, record those also so that you can return to them as you continue the unit.

For group 1: *Using your list, create as many categories of plant products as you can e. g., foods, clothing, tools, shelter, building materials, industrial products, cosmetics, cleaners, art products. Is there an area of human activity that plants don't contribute to?*

For group 2: *For each entry on your list, substitute something else (not a plant) for the plant image. Would the art/object/place have a different feel or effect on the viewer?*

For group 3: *Imagine a world without growing plants, where all food, oxygen, and other necessities are produced synthetically, and our lawns, trees, flowers, and shrubs are all artificial. Describe what it would be like. Using your list, what would be missing?*

For group 4: *How do landscapes (school yards, lawns, public parks, highway medians) planted by humans differ from natural landscapes? List as many as you can. [It may help younger students to actually look at the area surrounding your class room or meeting site while they discuss this.] Why do you think they are so different? Do the differences relate to how humans actually use the site?*

❁ Exploration: Five Ways of Thinking About Plants

Part I. Objective: To investigate more fully the details of how plants enrich our lives and society and support earth's environment.

1. Activity: Separate students into five groups. Each group is assigned a "secret statement" and provided with background information to use. After reading the background information, the students in each group research the topic using the time and resources designated by the teacher. They then make a collage using old magazines, posters, advertisements, newspaper clippings, original drawings, words, packaging labels, objects, etc. that illustrate their "secret" statement. The statements, known only to each group, are:

- A. Plants are the basis for earth's ecosystems and enter into many interactions with the environment and other living organisms. [ECOLOGICAL]
- B. Plants are important to humans because they delight our senses and create beauty in our surroundings. [AESTHETIC]
- C. Plants are used in many ways in human societies to express their culture. [e.g. art, architecture, holiday and religious traditions, money, jewelry, and language.] [CULTURAL]

D. Plants are a source of medicines, remedies, and behavioral therapies. [THERAPEUTIC]

E. Plants are used for food and made into useful products. [ECONOMIC]

2. Presentation: Have each group present their untitled collage to the class, explaining only three of the images or items on the collage. Using the words, "Plants are . . ." the class then tries to guess the content of the "secret statement" that is illustrated by the collage. The student presenters guide the guessing game by pointing to parts of the collage that further expand the guesses that are being made. The presenters or teacher can judge when the class has actually figured out what the collage is illustrating. The presenters then show the statement that they have illustrated. [written on the back of the board or another sheet of paper]. Note: for older students, you may want to add an element of competition by timing how long it takes the class to correctly guess the statement.

Part II. Objective: To realize that plants have shaped and continue to shape our landscapes, the development of societies, and the course of world history.

Option A: Students take an individual topic and research it for a time period that is appropriate for the age group, class structure, and format. A student report can take the form of a poster, drawing, written report, or interpreted collection of objects. For balance, the topics should be drawn from among all five ways that plants are important. See the accompanying list of suggested topics.

Option B: As a group, have the students watch all (or a portion of) a movie/video together, read a short story, or as a class assignment, read a book (see the list of suggestions below) and then participate in a discussion of the following questions:

1. What plants that were depicted in the movie/video/story? List them and be as specific as you can about the species or kind of plant. Assign each plant on the list to one or more of the 5 categories [aesthetic, economic, ecological, therapeutic, and cultural] based on how it was used in the story.
2. Which characters had significant involvement with the plants?
3. Did plants play a significant role in the development of the story and its outcome?
4. Did any of the characters invest a large amount of time, money, or personal interest in any of the plants in the story?
5. How would the story or its outcome have been different if the plants were different (e.g., desert vs forest or corn vs cotton or grass vs. trees)?

Making Connections

Return to some of the questions you tackled at the end of "Laying the Groundwork"

Other possible discussion questions:

For students in grades 6 and up:

- In our cities many people have little knowledge of where their food comes from or how it is grown. What consequences do you think this has for a society? When we think of the use of plants by humans for food, is that an ecological use or an economic use?
- Do you think there is a relationship between food and politics? Food and world peace?
- If there are two identical homes, one with attractive landscaping (trees, shrubs, flowers) and the other without, is one worth more than the other? Why? How could you find out if this is true?
- Planting trees and shrubs in inner-city blighted neighborhoods reduces crime. Why do you think this is so?
- What will happen to our natural landscapes if the global climate continues to warm up? What about the associated animal populations?
- What will happen to agriculture if the global climate continues to warm up? And to human societies as a result? Use your state's agricultural base as a starting point for discussion.

For students in elementary grades:

- What kinds of problems do farmers have in trying to grow their crops? How do these problems affect the supply of food?
- What could happen if a country rich in food were neighbors with a country poor in food? How could the rich country help the poor one, besides just giving it food?
- What would it be like to live somewhere with no trees? With no meadows, prairies, or lawns? With no flowering plants? With almost no plants at all (like the driest deserts)?
- When humans move, they often take plants with them, either by accident or on purpose. Can you give an example of how or why each might occur? Has your family ever moved any plants when you changed homes? [many of our “weeds” like dandelion, burdock, Queen Anne’s lace, and plantain are actually European imports dating from Colonial times.]
- How do plants “escape” from cultivation? Can you think of ways this might affect the environment at the new location?

Branching Out

- Create a painting or mural about the importance of plants to human life and the earth’s ecosystems. Use one of the five importances (aesthetic, cultural, ecological, economic, and therapeutic) as a theme.
- Visit your local botanic garden or arboretum on a field trip or encourage your students and their families to visit as a homework/extra credit project. See the accompanying background sheet.
- Visit a local nursery to find out about horticulture -- kinds of jobs/careers, how it contributes to the local economy, how many plants they grow, kinds of plants, etc.
- Talk with the grounds manager at your local public park or at your school about all the different kinds of plants that have to be cared for, the special skills, products, and equipment, time that are required, and how much money it costs. Are there ways that they could take action to help (e.g., not walking through flower beds, swinging on trees, starting seeds for flowers, having a school yard or park helper day)?
- Ask your local extension agent or master gardener to come in to your classroom or arrange a visit with a local farmer to talk about some of the issues raised in your discussions
- Break the class into two groups and have a plant product contest. Each group takes a plant, describes it and how/where it is cultivated, and finds as many products as possible that are made from the plant.
- Interview a pharmacist or visit a drug store to research therapeutic products that contain plants.
- Have an herbal tea tasting in your classroom; identify the herbs in each kind.
- Have groups identify the plant products that are being used in different areas in the home or school (e.g., kitchen, living room, bedroom, bathroom, yard, garage, sports area, cafeteria, office, classroom).
- Hold a debate on the statement “Artificial plants and flowers contribute as much or more to our cultural life and indoor environments as natural plants.” Each side should cite real examples from your local mall, restaurants, homes, cemeteries, and holiday observances; state the pros and cons for each side.
- Have students set up a cart with fragrant plants or plant products (e.g., mints, mentholated ointment for chest colds, chocolate bars, orange soda, crushed alfalfa, freshly mown grass, carnations from a florist, etc.), and interview adults about the memories that the fragrances evoke. Adults should close their eyes as students offer them samples to smell. Use disposable tissues or plastic cups as carriers for the fragrant substance; don’t reveal the identity of the product till after they sample its fragrance.
- Create a collage using greeting cards that use plant images
- Ask your local grocery store manager where all the fresh fruits and vegetables are coming from. Create a map showing where they are grown. Relate how differences in seasons between northern and southern hemisphere affects our supply of fresh food. Relate how the laws of different countries about the use of pesticides might affect our food supply.

Suggested research topics for Explorations

These may be interpreted narrowly or generally to meet the needs of the students.

Aesthetic:

The Mogul Gardens of India
Plants have texture
How to arrange flowers
New colors in favorite flowers
What is landscape architecture
How to dry flowers
Fragrant flowers
What is an oriental garden?
Window box gardens
Rock gardening
The historic gardens of Europe
A fascination with gardens-the legacy of the Dupont family in America
Bonsai
Cactus grafting
The history and use of topiary
My favorite flower (tree, plant)
My grandmother's (father's) flowers

Cultural

Plants on American coins
Van Gogh's sunflowers
Tobacco in American architecture
Sugar, slavery, and colonial Europe
Plants in European fairy tales
The history of perfume
The lotus, symbolism, and art
What it means to rest on your laurels
Why we decorate trees at Christmas
Frankincense, its history and use in religious ceremony
How the War of the Roses got its name
Plants in legends of Native Americans
The language of flowers
Flowers, funerals, and religion

Willow-The source of aspirin
Trash tree to miracle cure-the story of taxol
Rosemary, lavender & peppermint: herbs and aromatherapy
Horticultural therapy in America's hospitals
Prospecting for cures in the rainforest
Purple coneflower (*Echinacea*) and the common cold
St. John's wort-a plant to treat depression?
New thinking about herbal remedies
Mormon tea: A treatment for asthma
Ethnobotany of the _____ People (a

Ecological

Butterfly gardens
Plants that clean up the environment
The importance of planting trees
The history of atmospheric oxygen
How plants are different from animals
Why flowers come in different colors
The tragedy of deforestation
Plant in partnerships [e.g., lichens, mycorrhizal associations, orchid pollinators]
Flowers that change color
What global climate change means for plants
Birds that plant seeds
U.S. National Parks that honor special plants or plant communities
What makes a plant fragrant and why did it come to be that way?
Why not all plants are green
We're being invaded by aliens--plants that is
The big stink: gigantic flowers to avoid

Economic

Why you should care about gum arabic
Soybeans surround you
The flax (or Neem or Cotton) industry
The coming chocolate crisis
The global trade in vanilla (or roses, avocados, strawberries, lettuce, jasmine, coffee)
Tulipomania
Wheat, rice, and corn (maize) - three foods, three worlds
The origin of chewing gum
Cholesterol and coconut: how a health alert wrecked an industry
The USDA plant genome collection

Therapeutic

Native American tribe)
Garlic-a natural stimulant for the immune system
Ten herbs that can help or heal
Ayurvedic Medicinal Plants
Traditional Chinese Herbal Medicine
Fruits and vegetables that reduce cancer risk
Food as Medicine

Suggested movies and literature for Explorations

Many of these works are available in several production and publications formats (book, VHS videotape, audio cassette tape, paperback, hardback, etc.). Depending on the time you have available, you could use the entire work or a selected segment or chapter.

Full Feature or Made-for-Television

Films

Places in the Heart
Land Before Time
Jurassic Park
Little Shop of Horrors
Wizard of Oz
The Grapes of Wrath
Milagro Bean Field War
The Secret Garden
Alice in Wonderland
Fern Gully
The Name of the Rose
Watership Down
Swiss Family Robinson

Literature

Novels

Wizard of Oz
The Grapes of Wrath
Milagro Bean Field War
The Secret Garden
Alice in Wonderland
Watership Down
Swiss Family Robinson

Short Stories

Jack and the Beanstalk
The Man Who Planted Trees
Old MacDonald Had an Apartment House
Blueberries for Sal
The Little Red Hen
The Lorax

Nonfiction

Tales of a Shaman's Apprentice
Guns, Germs, and Steel
Into the Heart of Borneo
The Plant Hunters
Magnificent Voyages
The Island of the Blind

The U. S. Botanic Garden has suggested these works because plants play an important role in their subject content. We do not warrant the overall suitability of these works for your group and suggest that you preview the material before you use it in your classroom.

BACKGROUND: THE FIVE IMPORTANCES OF PLANTS

Here are a few examples just to get you started. You can illustrate these with, pictures, magazine cutouts, easy to create props, or products from your home! Challenge your students to add to this list.

1. Aesthetic - Plants are important because they are beautiful and delight our senses.

We grow and admire plants for their:

- nurturing effects / growing plants make people feel connected to earth's systems
 - children planting a garden
 - rooftop garden in an urban setting
 - houseplants; interior landscapes in the local mall
- stimulation through color and texture
 - containers of mixed plants
 - arrangement of dried flowers (straw flowers, statice)
- stimulation through fragrance
 - photos or bouquets of fragrant plants (roses, lilies, lavender, freesia)
 - fragrance can calming or stimulating, evoke memories, and be therapeutic (e.g., use crushed grass, vapor rub, or mints such as rosemary or peppermint)
- interesting fruit and seeds
 - pine cones, winged maple, tropical fruits from grocery
- creative landscape design possibilities
 - beautiful garden scenes

2. ECONOMIC - Plants are used for food and made into useful products.

- Food- all living things depend on plants for food
- Shelter- log cabin, wood frame house, hut of palm leaves and bamboo
- Fuel and Warmth- fossil fuels (coal and crude oil) comes from old dead plants and animals

Examples of broadly used economic plants

SOYBEANS

- Used as food for people and animals because it is high in protein.
- Soybean curd (tofu) is eaten in most Asian countries as is soy sauce
- Vegetarian burgers are made from soybeans(texturized vegetable protein)
- Soy oil is used for cooking and in margarine
- Vitamin E is extracted from soybeans

COTTON

- clothing and fabric
- cotton seed oil is used for food
- cotton seed meal is fed to livestock
- cotton swabs, balls, bandages
- paper
- in packing material

CORN

- syrup used in soft drinks
- oil used in margarine
- cornstarch used in cooking and sizing fabric
- Vitamin C is extracted from corn
- corn meal for animal feed
- in fuel (as ethanol)

CITRUS

- juice and flavorings
- source of vitamin C
- Nontoxic cleaners and degreasers
- perfumes and fragrances
- antibiotic ointments, facials

FLAX

- clothing (linen) is made from flax fibers also rope and sails
- linseed oil, from flax seed, is used in paints
- seed is used as a laxative
- glycerin is used in toothpaste and cosmetics

3. CULTURAL - Plants are important in our culture.

Plants are present in our cultural symbols, traditions, religious observances, and literature.

Symbols-money

- Laurel on the quarter and dime represents “the best” or “victory” as in the Greek games
- Oak on the dime represents strength
- Olive appears on the great seal of the U.S., on the half dollar, and dollar bill. It represents peace
- Plants appear on the money of other countries

Symbols-language

- Apple - A symbol of “Health or “goodness” or an offering of goodwill: Apple for the teacher; you are the “apple of my eye.” a person is a “good apple.”
- Spinach - Popeye and his spinach represent strength
- Flanders Poppy - to remember those who died in war
- “to rest on your laurels”
- “make hay while the sun shines”
- Brand names of products - “Palmolive” soap - originally made from the oil of palm and olive

Art

- Photos of different periods of art or famous artists showing flowers and plants
- Tapestry from the Middle Ages displaying flowers

Traditions

- Fall heralded with displays of pumpkins and chrysanthemums
- Christmas display of poinsettias and decorated evergreen tree or wreath
- Palm Sunday

Architecture

- U.S. Capitol - tobacco leaves on columns acknowledge that the economy of Colonial America was based on tobacco trade which helped finance the War of Independence
- lotus embellishes many institutional buildings
- ivy leaves in ornamental iron for fencing

Religion

- Incense for ceremonial use in Roman Catholic, Orthodox, and some Protestant churches- (frankincense) Mention of myrrh in the bible; use of copal (South American Native tribal ritual) and sandalwood (Hindu) in other world religions.
- Egyptians used plant oils for embalming their dead

4. THERAPEUTIC - Plants are a source of medicines and remedies.

Plants are a source of medicines and remedies.

Consult publications of the American Botanical Council for a wealth of information.

To name just a few:

- ginger- motion sickness and indigestion
- cancer- yew, mayapple, Madagascar periwinkle, and others
- asthma- ephedra
- severe pain- opium and its derivatives
- depression- St. John’s wort
- anxiety - valerian
- urinary tract infection- cranberry
- headache- feverfew
- toothache - clove oil

Familiar over-the-counter treatments from plants

- Willow- (*Salix*) aspirin for pain, fever
- Aloe vera- ointment for burns, skin irritation
- Witch hazel- (*Hamamelis virginiana*) bruises, skin astringent
- Jojoba- (*Simmondsia chinensis*) skin & hair treatment
- Rosemary - (*Rosmarinus officinalis*) facial wash & bath (antibacterial action & stimulates circulation)

5. ECOLOGICAL - Plants are the basis for Earth's life forms and ecosystems.

Plants are the basis for earth's life forms and ecosystems. Plants:

- produce earth's oxygen and clean the air [photos of the earth from space- the blue planet air scrubber plants].
- capture solar energy to make sugars and starches
- provide food and shelter for many kinds of animals
- create opportunities for other plants to grow
- are important for soil and water conservation [plants prevent erosion]
- build soil - decomposing plants contribute organic matter; roots associate with nitrogen fixing bacteria; roots break up rock substrate; decomposing leaves produce acid that dissolves minerals

Background: Branching Out Activity

What is a botanic garden?

It is a "zoo" for plants! This is a useful concept since far more students have visited zoos than have visited botanic gardens or arboreta. Ask students what they think a zoo for plants would look like. Would there be cages? Would plants from all over the world be possible to grow in one place?

What do they do at a botanic garden?

- Plant collections
- Research about plants
- Education about plants and the environment
- Conservation activities, locally, nationally, or internationally

Why should you visit a botanic garden?

- To see beautiful displays of plants
- To see rare, exotic, or endangered plants
- To learn about plants and their relationships to the environment, to other plants, and to animals
- To learn how plants have influenced our culture and civilization
- To learn about careers in the botanic garden
- To learn how to garden

Where are they found?

In most states and in virtually every country. To learn more, consult the WEBSITE of the American Association of Botanical Gardens and Arboreta at www.aabga.mobot.org/aabga or the WEBSITE of Botanic Gardens and Conservation International at www.rbgekew.org.uk/BGCI.

Resources

Levetin, Estelle and Karen McMahon, 1996. *Plants and Society*. Wm. C. Brown Publishers
Berg, Linda R. 1997. *Introductory Botany. Plants, People, and the Environment*. Saunders College Publishing.

Other Web Sites

Ethnobotany	www.ars-grin.gov/ngrlsb/ www.umd.umich.edu/resources/bydept2/besci/anthro/about_ethnobot.html
Botany	www.libertynet.org/bgmap/links.html
Plant trivia	www.huntington.org/BotanicalDiv/Timeline.html

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